

Amendment to the Claims:

The listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Original Claims 1-3 - cancelled without disclaimer or prejudice.

4. (New) A method for determining variations of resistivity index of a family of rock samples as a function of water saturation, in the presence of a non-electrically conducting fluid, comprising:

for each sample of the family of rock samples comprising at least first and second pore networks, determining a volume fraction occupied by each pore network by applying to the rock samples an NMR type relaxometry technique;

for each sample of the family of rock samples, measuring by mercury injection a pore throat distribution in the at least first and second pore networks;

determining experimentally on a sample used as a reference from at least the family of rock samples values of coefficients relating variation of electrical resistivity of the sample used as the reference as a function of water saturation of the sample used as the reference; and

determining the resistivity index of all the samples of the family of rock samples on a basis of a variation of parameters describing a layout of the pore networks and using values of the coefficients measured from the sample used as the reference.

5. (New) A method as claimed in claim 4, wherein values of the coefficients relating a total conductivity of the sample used as a reference to conductivity of the first and second pore networks and water saturation of the first and second networks are determined from the sample used as a reference with the resistivity index being calculated from the volume fractions of the first and second pore networks and from a value of a mean saturation from which one of the first and second networks with smaller pores is invaded by the non-electrically conducting fluid.

6. (New) A method as claimed in claim 4, wherein for a sample from a third pore network, values of the coefficients relating total conductivity of the sample from the third pore network to conductivity of the first and second pore networks and water saturations of the first and second networks are determined from the sample used as the reference, with the resistivity index being calculated from respective volume fractions of the first, second and third pore networks, from a value of mean saturation from which the network having smaller pores among the first and second pore networks is invaded by the non-electrically conducting fluid, and from a value from which the network having larger pores among the first and second pore networks is invaded by the non-electrically conducting fluid.